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PRINCE WILLIAM SOUND MANAGEMENT AREA
2000 SHELLFISH REPORT TO THE
ALASKA BOARD OF FISHERIES



By

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	iii
LIST OF FIGURES	iv
LIST OF APPENDICES	v
INTRODUCTION.....	1
DUNGENESS CRAB.....	1
Fishery and Harvest History.....	1
Management and Research Program.....	2
Stock Status.....	2
SPOT SHRIMP.....	3
Fishery and Harvest History.....	3
Management and Research Program.....	4
Stock Status.....	4
SIDESTRIPE SHRIMP	5
Fishery and Harvest History.....	5
Management and Research Program.....	6
1999 Season Summary.....	7
2000 Management Outlook.....	8
RAZOR CLAMS	8
Fishery and Harvest History.....	8
Management and Research Program.....	9
Stock Status.....	9
WEATHERVANE SCALLOPS	10
Fishery and Harvest History.....	10
Management and Research Program.....	11
1999 Season Summary.....	12
2000 Management Outlook.....	12
MISCELLANEOUS SHELLFISH	13
Squid and Octopus.....	13
Sea Cucumbers and Urchins.....	13

LIST OF TABLES

<u>TABLE</u>	<u>Page</u>
1. Shellfish Emergency Orders, Prince William Sound Registration Area E, 1997-1999.....	14
2. Copper River Area Dungeness crab survey results, 1985-1999.....	16
3. Prince William Sound spot shrimp survey results, 1989-1999	17

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Prince William Sound Shellfish Registration Area E	18
2. Prince William Sound Dungeness crab fishing districts and seasons.....	19
3. Prince William Sound pot shrimp management areas	20
4. Prince William Sound trawl shrimp fishing areas and seasons.....	21
5. Copper River razor clam harvest area.....	22
6. Prince William Sound scallop fishing areas and 1999 GH.....	23

LIST OF APPENDICES

<u>APPENDIX</u>	<u>Page</u>
A. Prince William Sound Area Dungeness crab commercial harvest, 1960-1999.....	24
B. Prince William Sound Management Area spot shrimp harvest, 1960-1999	25
C. Prince William Sound Management Area trawl shrimp harvest, 1972-1999.....	26
D. Prince William Sound Area razor clam harvest, 1960-1999.....	27

INTRODUCTION

The Prince William Sound (PWS) Management Area (Area E) is comprised of all waters of Prince William Sound and the Gulf of Alaska bounded by the longitude of Cape Suckling (143° 53'W) on the east and Cape Fairfield (148° 50' 15"W) on the west (Figure 1). This report documents the most recently completed shellfish fisheries in the area. The fisheries are the 1999 sidestripe shrimp *Pandalopsis dispar* trawl fishery and the 1999 weathervane scallop *Patinopecten caurinus* dredge fishery. Finally, razor clams *Siliqua patula* harvested under subsistence regulations are reported.

The following fisheries are also reviewed in this report although the 1998 - 1999 commercial seasons were not opened. The 1999 Dungeness crab *Cancer magister*, and the 1999 spot shrimp *Pandalus platyceros* fisheries were closed due to low stock abundance and poor recruitment.

Shellfish landings from the sidestripe shrimp trawl fishery in Area E during 1999 included 64,140 lb of trawl shrimp from three vessels. Harvest data from the 1999 weathervane scallop fishery are confidential. A department policy on confidentiality states that any time a fishery or statistical area has fewer than three participants, catch information may not be made public. Table 1 lists emergency orders affecting area fisheries during 1999.

DUNGENESS CRAB

Fishery and Harvest History

The Prince William Sound Management Area is divided into two Dungeness crab fishing districts; the Inside District and the Outside District (Figure 2). Historically, major Dungeness crab harvests have primarily occurred within Orca Inlet of the Inside District and the Copper River delta and Controller Bay areas of the Eastern Section of the Outside District. Dungeness crabs were also harvested from Orca Bay and the western PWS portion of the Inside District. However, harvests from these areas have been relatively minor (Appendix A).

Orca Inlet, which is immediately adjacent to the community of Cordova, once provided a fishery that allowed participation by small vessels in an area protected from adverse sea conditions. Harvests have ranged from over 1.0 million lb in the early 1960s to 35,000 lb in 1976. The Orca Inlet area of the Inside District has been closed since 1980.

The Copper River fishery occurs along the eastern portion of the Copper River delta and in the Controller Bay area. The recent 10 year (1983–1992) average annual catch and effort were approximately 590,000 lb and 12 vessels. The harvest peaked at 1.5 million pounds in 1981 declining to 70,000 pounds in 1991. The Copper River fishery has been closed since 1992.

Management and Research Program

Statewide Dungeness regulations provide for a male only harvest with a minimum legal size of 6.5 in. Gear requirements include a biodegradable escape mechanism and two 4 $\frac{3}{8}$ -in escape rings. Regulations which are specific to the PWS management area include superexclusive registration, a 250-pot limit for the Outside District, and a 100-pot limit for the Inside District.

Beginning in 1987, split regulatory seasons were implemented in the Copper River fishery in the Outside District with open season dates of March 20 to May 20 and July 25 to December 31. The regulatory closure extends from May 20 to July 25 and is designed to protect the stock from handling mortality during the soft shell period following the annual adult male molt. Additionally, the Contoller Bay area closes on October 15. The early fall closure is designed to reduce gear loss and consequent mortality from storms in this area of shallow water.

The department conducted an annual survey in the Orca Inlet area from 1977 to 1994 using standard Dungeness pots. In 1995, due to low abundance, the survey was changed to a biennial event. The department began a Dungeness pot survey in the late 1970s, conducted annually prior to the July 25 opening date in the Copper River fishery. If 10 percent or greater of the crabs are in a soft-shell condition the fishery was delayed and another survey was conducted in mid-August. Legal male catch per pot has declined from 16 in 1986 to 0.25 in 1998 (Table 2). The survey provided an index of abundance which declined with declining catches and forms one component of the justification for continued closure.

Stock Status

One of the major reasons for the continued suppression of the Dungeness crab population in Orca Inlet is predation by the sea otter. The otters arrived in large numbers during 1980 and immediately impacted the Dungeness crab stock. A sea otter predator/prey relationship study conducted in the late 1970s showed that when Dungeness crabs are available, an otter is capable of eating 10 crabs per day. The 1998 Orca Inlet assessment survey yielded a total of two Dungeness crabs in 30 pot lifts.

Other possible explanations for the decline of the Copper River Dungeness crab stock and failure to recover include periodic recruitment, climatic change (change in rates of predation, disease, or larval survival) and overfishing. The most recent large-scale recruitment event occurred in 1986. To what extent over fishing contributed to the collapse of the Dungeness crab population in the Copper River fishery is unknown. However, it is true that seasons continued despite a lack of obvious recruitment. Therefore it is reasonable to believe that the harvest levels of the 1970s and 1980s were not sustainable. Finally, PWS Dungeness crab occur at the northern extent of the range for this species, and this factor may have implications for both growth and recruitment. The number of

legal crab per pot in the August 1999 survey was 0.74.

Despite long-term closure of fisheries, Dungeness crab stocks in PWS remain depressed. The department is concerned about the need to protect the existing population to maximize reproductive opportunity at a time when ecological conditions have improved. Because a stock recovery is not anticipated in the near term and all crab are needed to sustain the limited existing productivity, a regulatory closure of all fisheries has been requested in Proposal 388. The department will continue to monitor PWS Dungeness crab stocks through pot surveys. When recovery of the population is evident, a management plan will be developed for consideration by the board and user groups.

SPOT SHRIMP

Fishery and Harvest History

The Prince William Sound shrimp pot fishery primarily occurred within the Inside District. The primary harvest area encompasses the northern shore of PWS from Port Valdez to Whittier and all of western and southwestern PWS including Montague Strait. During the period when the fishery was actively prosecuted, this area was designated as the Traditional Harvest Area (THA) (Figure 3).

The shrimp pot fishery targeted spot shrimp and to a limited extent coonstripe shrimp. Commercial shrimp landings were first documented in 1960 when 4,988 lb were harvested. Early seasons lasted the entire year. From 1960 through 1977, catch varied from no reported harvest in 1962 and 1966 to a high of 25,000 lb in 1974 (Appendix B). The shrimp pot fishery expanded rapidly after 1978 with increases in both catch and effort. Growth of the fishery was greatest from 1978 through 1982. During this period local markets were established and the major harvest areas located.

During the period 1982–1984 the open season was reduced to April 1 through November 30 with a guideline harvest range of 75,000 to 145,000 lb. Despite the shortened fishing season catch and effort increased to 214,000 lb and 79 vessels. In subsequent seasons, catch and effort reached historical highs of 290,632 lb in 1986 and 86 vessels in 1987. By 1989 catch and effort had declined to a low of 29,315 lb from 33 vessels. A limited spot shrimp fishery was held in 1991 with a conservative guideline harvest range of 10,000 to 40,000 lb. The 1991 fishery closed after 46 days of fishing and the harvest totaled 17,580 lb taken by 15 vessels making 45 landings. Fishery performance data from the 1991 fishery indicated that the stock was at a very low level. The commercial spot shrimp season has remained closed in the THA since, due to low abundance.

Management and Research Program

Statewide shrimp regulations specify buoy marking, maximum tunnel size, and a biodegradable escape mechanism. In 1984 the BOF adopted a spot shrimp management plan which recognized the need for a conservative management policy for the THA. Among other things the plan called for seasons avoiding peak egg bearing periods and guideline harvest ranges (GHR). This resulted in two open seasons per year (March 15 – June 30 and August 15 – December 15) and a GHR of 75,000 to 100,000 lb per season. During the spring 1994 meeting the BOF lowered the GHR for PWS shrimp to 0–100,000 lb. Additional regulations specific to shrimp fishing with pot gear include a limit of 150 pots per vessel and pots with a definable side must have at least two adjacent sides completely composed of rigid mesh that allows the unaided passage of a 7/8-in dowel. Round pots must have the rigid mesh covering a minimum of 50% of the vertical surface area of the pot. A commissioner's permit is required to fish in the Eastern area to allow the monitoring of effort and catch via mandatory logbooks and department contact.

In 1989 the department began a survey in the THA to assess spot shrimp. Six stations in the northern, western, and southwestern portions of PWS have been surveyed annually with pot gear since 1989. Two additional stations in southwestern PWS were added in 1991. Data from the survey, specifically CPUE and sex ratios, were used in making management decisions regarding the 1991 fishery and in subsequent years when no fishery occurred. Department survey catches declined 44% from 1.3 lb per pot in 1989 to 0.73 lb per pot in 1992. Since 1993, survey catches have ranged from 0.59 lb per pot in 1995 to 0.29 lb per pot in 1998, and have averaged 0.43 lb/ pot. The 1999 survey yielded 0.47 lb per pot. The percentage of egg bearing females captured has varied throughout the course of the survey from 19% in 1993 to a low of 3.9 percent in 1995. The percentage of egg bearing females in the 1998 survey was 5.4%.

Stock Status

The department studied PWS spot shrimp as part of the damage assessment arising from the *Exxon Valdez* oil spill. From that study it was deduced that the decline in spot shrimp was from overfishing. Tagging studies conducted in the mid 1980s showed that PWS spot shrimp are long-lived and slow-growing, characteristics that emphasize the need to keep fishing mortality low. Serial depletion was most likely occurring in that fishers moved to keep CPUE high masking the decline in abundance until it was widespread. Spot shrimp are also remarkably sedentary making them particularly susceptible to serial depletion. The fishery is also size or female selective in that spot shrimp begin life as males and grow and mature into females. Similar to other shellfish along the margins of the Gulf of Alaska, climatic conditions are probably hindering recovery.

Past management strategies failed to provide for a sustainable fishery and despite long-term closure of fisheries, the spot shrimp population in PWS remains depressed. The department is concerned about the need to protect the existing population to maximize reproductive opportunity at a time

when ecological conditions have improved. Because a stock recovery is not anticipated in the near term and most spot shrimp are needed to sustain the limited existing productivity, a regulatory closure of the commercial fishery has been requested. The department has requested in Proposal 393 that the Board of Fisheries close the PWS commercial pot shrimp fishery by regulation and reopen upon rebuilding of the population and adoption of a new management plan. The new management plan should address the hazards of serial depletion, account for spatial stock structure, slow growth, and sedentary nature of the spot shrimp, and the female-selective nature of the fishery.

SIDESTRIPE SHRIMP

Fishery and Harvest History

The PWS shrimp trawl fishery primarily occurs within the Inside District. Principal harvest areas are in the northwest, and central/southwest portions of the Sound (Figure 4). Prior to 1998, regulations defined the Northwest Shrimp Trawl Fishing District (NSTFD) as those waters north of 60° 27' N. lat. and west of 147° 20' W. long. . This area was inadvertently omitted from regulation in 1998 when district boundaries were further defined. In practice however, the fishery is currently managed with the benefits of this district boundary. Furthermore, the NSTFD is divided into two sub areas, the Port Wells and Wells Passage portion, and the Perry Pass portion.

The PWS shrimp trawl fishery was founded in the early 1980's when several large Kodiak based vessels harvested pink shrimp *Pandalus borealis* in the southwest portion of the Sound. The fishery for pink shrimp declined due to the low ex-vessel value, limited processing capabilities, and declining stocks. After the trawl fishery for pink shrimp was fully developed, catches ranged from 218,000 lb to 1.3 million lb and effort ranged from 3 to 14 vessels (Appendix C).

The first documented harvest of sidestripe shrimp occurred in 1983 from the Icy Bay area in southwestern PWS, however, subsequent activity focused on Port Wells and Wells Passage in northwestern PWS. Increased harvests of sidestripe shrimp began in 1985. The reason for the sudden expansion was the development of markets and gear by fishermen with small, efficient vessels, targeting on stocks which were previously unfished.

The sidestripe shrimp fishery has operated chiefly out of the ports of Whittier and Valdez. Sidestripe tails were sold fresh in PWS communities and Anchorage while markets for whole, fresh, and frozen sidestripe shrimp existed in both Anchorage and Japan. Harvests during the developing years (1987-1991) came almost exclusively from the Port Wells and Wells Passage areas. From 1987 to 1993, catch and effort increased from less than 100,000 lb landed by 2 vessels to 246,000 lb landed by 7 vessels. The increased harvests in these years reflects increases in both effort and areas fished.

Concern for the conservation of the sidestripe shrimp resource in Port Wells and Wells Passage area heightened as catch and effort increased. In April 1990 the department initiated a program utilizing onboard observer data to calculate an area-swept estimate of shrimp abundance in the Port Wells and Wells Passage area. A 20% harvest rate was applied to the estimate to determine a guide line harvest level (GHL). Although this management strategy seemed conservative, harvest levels declined from 80,000 lb in 1991 to 25,000 lb in 1998. With attainment of the respective harvest levels, the fishery in the Port Wells and Wells Passage area generally closes by emergency order mid-way through the April 15 – August 15 season.

The GHL for the Perry Pass area of the NSTFD was established at 16,000 lb in 1995 based upon the area swept biomass estimate and 20% harvest rate methodology. In 1996 this GHL was increased to 18,500 lb. The incremental increase was intended to provide an opportunity for exploratory fishing within this area. The GHL remained at 18,500 into the 1998 season, however the fishery was closed considerably short of GHL due to declines in CPUE. Effort levels throughout this period remained very low.

The trawl fishery in the central and southwest areas of PWS has been managed based upon historical catches and CPUE. During the years 1992 and 1993, effort in the central and southwest areas increased sharply and included two larger catcher-processors. Catch and CPUE have declined in these areas resulting in reduced harvest levels. Since 1995 the GHL for the central and southwest areas has been set at 33,000 lb and effort has declined to extremely low levels. The central and southwest areas were closed by emergency order in 1997 with attainment of the GHL at the end of the April 15 – August 15 season. However, harvests did not quite attain the GHL in 1998.

Management and Research Program

Since the development of the sidestripe shrimp fishery, a variety of regulatory measures have been developed by both industry and the department and adopted by the BOF. These regulatory measures were most recently restructured in 1994.

At the spring 1994 shellfish meeting the BOF created the Northwest Shrimp Trawl Fishing District (NSTFD) and set open season dates of April 15 to August 15, and October 1 to December 31 for the entire management area. The spring open season date change was based upon data which indicated that egg release was not complete until April 15. The fall open season date was changed based upon the recommendation of fishermen stating that soft shell shrimp were present until October 1. Additionally, the BOF changed the cod end requirement and stipulated that the entire cod end will consist of square hung $1\frac{7}{8}$ in mesh. Other changes made in the regulatory framework of the shrimp trawl fishery included the deletion of the Icy Bay Shrimp District and its guideline harvest range (GHR).

In summary the current regulatory measures for trawl shrimp are:

- 1) April 15- August 15 and October 1-December 31 season dates.
- 2) Cod end mesh must be completely composed of 1 7/8 inch stretched mesh hung horizontal and perpendicular to the mouth of the trawl.
- 3) A year-round closure in eastern Prince William Sound (Port Fidalgo, Orca Bay, Hinchinbrook Entrance, and north Montague) to minimize indirect fishing mortality on depressed stocks of king and Tanner crabs in these key production areas.

In addition, there is a commissioner's permit requirement for shrimp trawling in the PWS Management Area. Amongst other conditions, terms of the permit specify that no more than 10% of the shrimp onboard may be pink shrimp or other pandalid species, completed log sheets must be returned with fish tickets within seven days of landing, and trawls must contain a fish excluder device to reduce bycatch of non-target species.

The GHL is based on data collected by department onboard observers regarding catch per unit area. Catch performance data is used to calculate an area-swept estimate of shrimp abundance in the Port Wells and Wells Passage area. A 20% harvest rate was applied to the estimate to determine a guide line harvest level . The catch is also sampled for sex and length composition.

1999 Season Summary

The PWS sidestripe shrimp fishery opened by regulation on April 15, 1999. Preliminary harvest levels for the Port Wells and Wells Passage area were established at 25,000 lb based on the results of the 1998 assessment. The preliminary harvest levels for the remainder of the NSTFD and the Central and Southwest areas were 14,000 lb and 33,000 lb respectively. The harvest level in the Port Wells and Perry Pass portion of the NSTFD was subsequently adjusted inseason to 19,000 lb based upon biomass estimates generated using area-swept and 20% harvest rate methodology.

The Port Wells and Wells Passage portion of the NSTFD closed by emergency order on June 1, 1999 due to the projected attainment of the guideline. Similarly, Perry Pass and the remainder of the NSTFD closed on July 15, 1999. Actual harvests in the above areas remains confidential due to the limited number of participants. The Central and Southwest areas remained open through the fall season and the harvest from this area totaled 31,374 lb.

Total harvest in 1999 was 64,140 lb, which included 7,754 lb of deadloss, from 47 landings by 3 vessels. Deadloss was composed of unmarketable or small sidestripe and pink shrimp. Deadloss typically accounts for 5% to 45% of the shrimp catch depending upon the vessel and its markets. Two of the 3 vessels participating in the fishery operated otter trawls; the other was a beam trawl. Vessel length ranged from 42' to 64'.

2000 Management Outlook

The department will continue to manage the sidestripe trawl fishery in the Port Wells area via a 20% harvest rate applied to an area-swept population estimate generated from commercial trawl vessel data. Fishery performance data collected since 1999 indicates that the sidestripe shrimp stock in the Port Wells and Wells Pass portion of the NSTFD has declined from earlier years. Catch per hour towed declined by approximately 50% from 1991 to 1992 and has continued to gradually decline through 1999. The department plans to maintain a conservative approach in setting a GHF for this area. Effort in the fishery is expected to remain stable due to the relatively low overall harvest. Any increase in effort, however, will likely result in the early attainment of the harvest level thereby prompting a closure prior to the regulatory date.

The central and southwest areas of PWS have received light effort since 1993. Current catch rates in these areas of PWS indicate that the stock is small. Catch and catch rates in the central portion of PWS have varied from 1993 to 1996 but have remained relatively stable since 1997. The 2000 preseason guideline harvest level for this area will be set equal to the 1999 harvest. The department will continue to monitor logbook data for significant changes in CPUE.

RAZOR CLAMS

Fishery and Harvest History

Beginning in 1916 and continuing into the mid 1950s, Cordova was known as the “razor clam capital of the world.” Although historical fishery statistics are imprecise, it appears that the majority of razor clams were harvested from Orca Inlet and the western Copper River Delta (Figure 5). The eastern Copper River Delta, which includes Kanak Island, was not a substantial contributor to the early harvests. Catches during this time ranged from 3.6 million lb in 1917 to a frequent harvest of over 1.0 million lb. Most of the product was canned and used for human consumption.

Beginning in the 1950's and continuing into the early 1980s, commercial demand for razor clams shifted to Dungeness crab bait. Coincident with the market shift, the PWS razor clam industry experienced a period of decline. The demand for razor clams for human consumption increased again in 1983 when a decline in clam abundance in Washington state led to an expanded fishery in Prince William Sound. Since 1983 the majority of the clam harvest has been taken at Kanak Island beach with minor amounts coming from Softuk and Katalla beaches on the eastern Delta. Yearly harvests during the 1980's attained a maximum of 168,000 lb in 1984 declining to 7,000 in 1988 with a recent ten year (1979 - 1988) average harvest of 48,000 lb by an average 16 diggers (Appendix D). No one has harvested razor clams since 1988 except in 1994 when fewer than 3

diggers participated resulting in confidential harvest records.

There was no commercial harvest of razor clams from the PWS management area in 1999. The reported non-commercial harvest (subsistence, sport, and personal use) during 1999 was 29 lb. The department issued 13 non-commercial permits for the Copper River Delta. Among those permitted, 5 dug clams and 8 did not dig. Harvests occurred on Katella, Kanak, and Softuk beaches.

Management and Research Program

The department currently monitors commercial razor clam harvests via fish ticket information. If effort increases at Kanak Island, the department will monitor the stock via catch per unit of effort data. The non-commercial harvest from the Copper River Delta is monitored through a permit system which requires a harvest report.

A guideline harvest range of 100,000 to 150,000 lb is in effect for the combined commercial and sport/subsistence harvests from Kanak Island. By regulation, clams harvested from Kanak Island must be used for human consumption as food. There is a 4 1/2 in (114 mm) minimum legal size for all commercially harvested razor clams. On the Copper River Delta, noncommercially harvested razor clams also have a minimum legal size of 4 1/2 in (114 mm). Razor clams from Kanak beach need annual certification by the Alaska Department of Environmental Conservation (ADEC). Certification allows bivalves to be sold for human consumption.

Stock Status

The decline in razor clam harvest in Orca Bay and western Copper River delta was attributable to a variety of factors including; a market shift from the West coast to the East coast clam fishery and substrate change caused by alteration in the Copper River outflow which severely affected juvenile survival. Subsequent to this the "Good Friday Earthquake" in 1964 caused significant uplift in prime razor clam habitat in Orca Inlet. This loss of habitat resulted in record low harvests in the 70's and early 80's and caused a shift in clam digging effort to the east side of the Copper River delta and Controller Bay area. Although the department does not conduct population estimates, reports from non-commercial diggers indicate that razor clam abundance has declined over the previous five years in the eastern delta, Katalla, and Controller Bay areas. This information is supported by the lack of interest from commercial diggers and the low number of permits issued in recent years.

The department does not assess the abundance of razor clams in Prince William Sound. Currently there are no areas within PWS that are certified for commercial clam harvest by the Alaska Department of Environmental Conservation. No harvest of the razor clam resource would be permitted until regulatory requirements of both ADEC and ADF&G are met. However, if the

fishery is redeveloped at Kanak Island, the department will monitor the stock via catch per unit of effort data.

WEATHERVANE SCALLOPS

Fishery and Harvest History

The first commercial fishery for weathervane scallops in the PWS management area occurred in 1992 with a harvest of 208,836 lb of meats taken by 4 boats. Fishing began in late February 1992 and closed by emergency order on April 23. The closure was based upon an allowable harvest of 64,000 lb meat weight which was established by developing an area-swept scallop biomass estimate using fishery performance data and applying a 10% harvest rate. The discrepancy between allowable (64,000 lbs) and actual harvest (208,836 lbs) was directly attributable to a lack of timely and accurate catch reporting. Harvests occurred from two statistical areas (202-09 and 202-10) in the Kayak Island vicinity (Figure 6).

After the eastern Gulf portion of the management area closed, participants expressed an interest in exploratory fishing in the western Gulf portion of the area. Effort in the western Gulf portion of the management area was low with only 2 participants and no reported harvest. Waters of PWS and the nearshore Gulf remained closed to scallop dredging due to bycatch concerns for depressed Tanner and Dungeness crab stocks

The 1993 PWS scallop fishery was prosecuted under the interim Management Plan for High Impact and Emerging Fisheries. Registration requirements specified the presence of an onboard observer and radio contact twice daily to report fishing area, number of tows, sampling intensity, crab bycatch, and scallop catch. The fishery opened at 12:00 noon July 15 and closed at 7:00 a.m. July 18. Seven vessels landed 63,068 lb of scallop meats. Four vessels made tows in the western Gulf area after the Eastern area closed. No catch was reported from this area.

The commercial scallop season did not open during 1994 due to the change of season dates from July to January. Any harvest in 1994 would have effectively doubled the removals from the stock during the same spawning cycle.

The 1995 weathervane scallop fishery opened at 12:00 noon on January 10 and closed by emergency order at 6:00 pm on January 26 due to attainment of the guideline harvest level of 50,000 lb meat weight. Two vessels participated; therefore, the catch data are confidential. Harvest again occurred over a small area and was confined to 2 statistical subareas. Permit stipulations were identical to the 1993 fishery, with the exception that the line dividing the eastern and western area was moved to 146°00' W. long. Waters west of 146°00' west longitude remained open to exploratory fishing, however, no fishing occurred.

Subsequent to the 1995 season closure on January 26, a vessel fished the Kayak scallop bed but remained outside the 3 mile territorial waters limit. This was due to a loophole in the Magnusson Act which allowed for harvest in the EEZ provided that a vessel was not licensed or registered by the State of Alaska. The estimated harvest by this vessel was 60,000 lb meat weight. This amount effectively doubled the allowable harvest for 1995.

Due to the illegal fishing that occurred near Kayak Island in 1995, the commercial scallop season in federal waters remained closed during 1996. Similarly, the State waters season in the eastern area also remained closed in 1996 to avoid overharvest of the scallop resource in the vicinity of Kayak Island. No effort occurred in the western area.

The 1997 PWS scallop fishery opened at 12:00 noon January 10 and closed 9:00 a.m. January 19, 1997. Only one vessel participated in the fishery, therefore the catch data remains confidential. A GHL of 17,200 lb of scallop meats was established for this fishery based upon the department's 1996 Kayak Island area assessment survey. A conservative GHL was warranted as survey results indicated that recruitment to the Kayak Island bed was very low, and only 11% of sampled scallops were less than age 7.

The 1998 Kayak Island scallop fishery opened 12:00 noon July 1 with a GHL of 20,000 lb. A department survey conducted in June of 1998 assessed scallop beds on the east and west sides of Kayak Island. Results of the survey indicated that ages 9, 10 and 11 accounted for 72% of the population in the eastern bed, and that ages 8, 9, 10 and 11 accounted for 69% of the population in the western bed. Concerned about the lack of recruitment within the scallop beds, conservative guideline harvest levels of 6,000 and 14,000 pounds of scallop meats for east and west areas, were determined by applying a 7.62% meat recovery to the estimated population, and then applying 5% and 7.5% harvest rates respectively. The longitude of Cape Saint Elias would delineate the boundary between the east and west harvest areas.

The Kayak Island fishery in the eastern harvest area closed at 1:30 p.m. July 2, 1998, and the fishery in the western harvest area closed at 6:00 p.m. July 4. Two vessels participated in these fisheries and harvest data remains confidential.

Management and Research Program

During 1992, in response to the increases in scallop harvests statewide, the department began development of an interim fisheries management plan under 5 AAC 39.210. Management Plan for High Impact and Emerging Fisheries. This interim management plan was formulated and implemented in July 1993, prior to the opening in PWS.

Key features of the PWS portion of the plan included:

1. Area registration.

2. Gear requirements including 4" ring size and maximum of two 15' dredges.
3. Guideline harvest level of 50,000 lb meat weight.
4. Bycatch caps of 500 and 130 Tanner crabs east and west of 147°00' W. longitude, respectively.
5. Season dates set by emergency order.
6. Industry funded observer program.
7. Crew size limit of 12.

Two scallop fishing areas were established for the PWS Management Area. The Eastern area comprised the location of the primary harvest and had a quota of 50,000 lb meat weight. The Western area opened to provide an opportunity for exploratory fishing with an initial quota of 5,000 lb.

The Statewide Scallop Management Plan was adopted with changes during the spring 1994 BOF meeting. The season opening date was set at January 10 with the closure set by emergency order. Additionally, the 1994 Plan established closure areas in the eastern portion of PWS and along the Copper River Delta (Figure 6). These closures were intended to address concerns for depressed Tanner crab stocks within PWS and the depressed Dungeness crab stocks in the Copper River Delta area. At the 1997 BOF meeting, the opening date of the scallop season was changed from January 10 to July 1.

In August of 1995, the department conducted their first dredge survey of the Kayak Island scallop bed to assess the stock and examine effects of the greater than anticipated 1995 harvest. Since 1996 the Kayak population has been assessed every other year to estimate abundance, age and size composition, and sexual maturity of weathervane scallops. Conservative exploitation rates of 5% and 7.5% was applied to scallop abundance estimates for beds east and west of Kayak Island. This was done in response to the longevity of weathervane scallops in Alaska, observed variable recruitment, and the current stock structure indicating that the population is supported primarily by two year classes.

1999 Season Summary

The 1999 Kayak Island scallop fishery opened 12:00 noon July 1 with a GHL's of 6,000 and 14,000 pounds of scallop meats for harvest areas east and west of Cape Saint Elias respectively. The fishery in the eastern harvest area closed at 6:00 a.m. July 3 and fishery in the western harvest area closed at 12:00 noon July 4. Two vessels participated in these fisheries and harvest data remains confidential.

2000 Management Outlook

The Kayak Island commercial scallop fishery will open on July 1. The department plans to conduct

a scallop assessment in the Kayak Island area prior to the fishery to establish the GHL. The department remains concerned for the health of the scallop stock in the eastern area due to the relatively narrow range of ages evident in the fishery. If the age structure of the stock remains the same, the GHL will likely be reduced. Effort in this fishery will likely remain low due to the relatively small PWS GHL. The department has submitted Proposal 398 to remove the provision for exploratory fishing for new scallop beds in the PWS area after the closure of the directed fishery around Kayak Island.

MISCELLANEOUS SHELLFISH

Squid and Octopus

There is currently no directed fishery for squid or octopus. Squid are taken as bycatch during the commercial pollock fishery and to some extent in the shrimp trawl fishery. Since 1989 the harvest of squid have ranged from 500 lb in 1991 to 22,300 lb by 12 vessels in 1998. The average harvest throughout this period is 6,900 lb by 5 vessels. The 1999 harvest totaled 6,900 lb, by 7 vessels.

Octopus are primarily harvested incidentally to pot groundfish fisheries, and particularly in the Pacific cod pot fishery. Harvests of octopus first exceeded 1,000 lb by 5 vessels in 1992, and attained a record harvest of 5,500 lb by 7 vessels in 1994. The average harvest from 1992 to 1998 was 3,400 lb. No harvests of octopus were recorded in 1999. Persons interested in directed fishing would need to apply for a permit upon which the department can stipulate location and duration of harvests, limit gear and other harvest procedures. However, it is unlikely the department would issue a permit to target octopus until a conversation based management plan is developed and a developing fishery policy can be followed.

Sea Cucumbers and Urchins

There have never been any reported landings of sea cucumbers or urchins from the PWS Management Area. The department does not survey either sea cucumbers or urchins. The most recent effort for sea cucumbers occurred in 1992 when 5 permits were issued, however, no catch was reported. This is consistent with anecdotal reports on abundance from both department and sport divers. No permits have been issued for sea urchin harvest. Anecdotal information indicates few urchins of a marketable size in PWS.

Table 1. Shellfish Emergency Orders, Prince William Sound Registration Area E, 1997 -1999.

Fishery	Emergency Order #	Effective Date	Explanation
Tanner	2-S-E-01-97	01/01/97	Personal Use – Closed Orca Bay and Hinchinbrook Entrance due to low stock abundance.
	2-S-E-02-97	01/01/97	Subsistence – Closed Orca Bay and Hinchinbrook Entrance due to low stock abundance.
	2-S-E-03-97	01/15/97	Commercial – Closed Prince William Sound area for the 1997 season due to low stock abundance.
King	2-S-E-08-97	02/20/97	Personal Use – Closed northern Montague, Hinchinbrook Entrance and Orca Bay due to low stock abundance.
	2-S-E-07-97	02/20/97	Subsistence – Closed northern Montague, Hinchinbrook Entrance and Orca Bay due to low stock abundance.
	2-S-E-14-97	10/01/97	Commercial – Closed Prince William Sound for the 1997-1998 registration year due to low stock abundance.
Dungeness	2-S-E-04-97	01/01/97	Personal Use – Closed Orca Inlet due to low stock abundance.
	2-S-E-05-97	01/01/97	Subsistence – Closed Orca Inlet due to low stock abundance.
	2-S-E-10-97	07/25/97	Commercial – Closed the Copper River District until May 20, 1998 due to low stock abundance.
	2-S-E-11-97	07/25/97	Commercial – Originally issued as 2-S-E-10-97. This EO corrected an error in the assigned number. Closed the Copper River District until May 20, 1998 due to low stock abundance.
Pot Shrimp	2-S-E-09-97	05/01/97	Commercial – Closed the western portion of Prince William Sound (formerly the Traditional Harvest Area) for the 1997 season.
Trawl Shrimp	2-S-E-10-97	06/20/97	Commercial – Closed the Port Wells area within Prince William Sound for the remainder of the 1997 season.
	2-S-E-12-97	07/28/97	Commercial – Closed the Northwest Shrimp Trawl Fishing District within Prince William Sound for the remainder of the 1997 season.
	2-S-E-13-97	10/01/97	Commercial – Closed the waters of Prince William Sound for the remainder of the 1997 season.
Scallops	2-S-E-06-97	01/19/97	Commercial – Closed waters of Prince William Sound south of 60° N. Latitude and east of 146° W. longitude.
Tanner	2-S-E-01-98	01/01/98	Personal Use – Closed Orca Bay and Hinchinbrook Entrance due to low stock abundance.
	2-S-E-02-98	01/01/98	Subsistence – Closed Orca Bay and Hinchinbrook Entrance due to low stock abundance.
	2-S-E-03-98	01/15/98	Commercial – Closed Prince William Sound for the 1998 fishing season.
King	2-S-E-05-98	01/06/98	Personal Use – Closed Orca Bay, Hinchinbrook Entrance and eastern Prince William Sound for 1998.
	2-S-E-06-98	01/06/98	Subsistence – Closed Orca Bay, Hinchinbrook Entrance and eastern Prince William Sound for 1998.
	2-S-E-13-98	10/01/98	Commercial – Closed entire Prince William Sound Management Area to commercial harvest of all species

			of king crab for the 1998-1999 registration year.
Dungeness	2-S-E-04-98	01/01/98	Subsistence - Closed Orca Inlet for the 1998 calendar year.
	2-S-E-11-98	08/25/98	Commercial – Closed Prince William Sound through August 25, 1999.
Pot Shrimp	2-S-E-07-98	05/01/98	Commercial – Closed Prince William Sound for the 1998 calendar year.
Trawl Shrimp	2-S-E-10-98	07/16/98	Commercial – Closed Wells Passage and Port Wells within Prince William Sound.
	2-S-E-12-98	10/01/98	Commercial – Closed the Northwest Shrimp Trawl Fishing District within Prince William Sound.
Scallops	2-S-E-08-98	07/2/98	Commercial – Closed waters of Prince William Sound east of 144°35.9 W. longitude and south of Kayak Island to 143° 53 W. longitude.
	2-S-E-09-98	07/04/98	Commercial – Closed waters of Prince William Sound east of 146°00 W. longitude to 144°35.9 W. longitude and north of Kayak Island.
Tanner	2-S-E-01-99	12/22/98	Personal Use – Closed described waters of Orca Bay and Hinchinbrook Entrance for the entire 1999 calendar year.
	2-S-E-02-99	12/22/98	Subsistence – Closed described waters of Orca Bay and Hinchinbrook Entrance for the entire 1999 calendar year due to low stock abundance.
	2-S-E-03-99	12/23/98	Commercial – Closed entire Prince William Sound for the 1999 fishing season.
King	2-S-E-05-99	12/23/98	Personal Use – Closed Orca Bay, Hinchinbrook Entrance and eastern Prince William Sound for the 1999 calendar year.
	2-S-E-06-99	12/23/98	Subsistence – Closed Orca Bay, Hinchinbrook Entrance and eastern Prince William Sound for the 1999 calendar year.
Dungeness	2-S-E-04-99	12/23/98	Subsistence - Closed Orca Inlet for the 1999 calendar year.
	2-S-E-12-99	08/17/99	Commercial – Closed Prince William Sound through August 25, 2000.
Pot Shrimp	2-S-E-07-99	04/13/99	Commercial – Closed Prince William Sound for the 1999 calendar year.
Trawl Shrimp	2-S-E-08-99	05/28/99	Commercial – Closed Wells Passage and Port Wells within Prince William Sound effective June 1, 1999.
	2-S-E-11-99	07/15/99	Commercial – Closed the Northwest Shrimp Trawl Fishing District within Prince William Sound effective 12:00 noon July 15, 1999.
Scallops	2-S-E-09-99	07/02/99	Commercial – Closed waters of Prince William Sound east of 144°35.9 W. longitude and south of Kayak Island to 143° 53 W. longitude.
	2-S-E-10-99	07/04/99	Commercial – Closed waters of Prince William Sound east of 146°00 W. longitude to 144°35.9 W. longitude and north of Kayak Island.

Table 2. Copper River Area Dungeness crab survey results, 1985-1999.

Year	Number of Pots	Legal Crabs	True Recruits	% Newshell True Recruits	Sublegal Crabs	Newshell Sublegal	% Newshell Sublegal	Female Crabs
1985	N/A							
1986	65	16.0	12.1	76%	10.8	3.8	35%	3.1
1987	80	9.9	4.3	43%	13.1	5.9	45%	10.5
1988	80	8.0	4.8	60%	11.8	4.1	35%	9.2
1989	N/A							
1990	80	8.3	3.0	36%	8.6	1.9	22%	8.0
1991	80	3.5	2.2	63%	12.6	3.2	25%	6.8
1992	80	1.1	0.3	27%	10.0	3.4	34%	2.0
1993	37	3.5	1.6	46%	15.8	4.5	28%	3.7
1994	78	1.4	0.3	21%	9.2	3.1	34%	1.4
1995	80	1.5	0.3	20%	9.9	3.0	20%	0.7
1996	80	1.1	0.3	24%	3.5	1.3	37%	0.1
1997	45	0.1	0	0%	3.3	0.96	29%	0.4
1998	65	0.25	0.08	31%	7.4	3.8	52%	0.3
1999	80	0.74	0.74	64%	9.7	2.9	30%	0.6

Table 3. Prince William Sound spot shrimp survey results, 1989–1999.

Year	No. Pots	No. LBS	Mean WT Per Pot	No. Shrimp	Mean No. Shrimp/Pot	No. Male	% Male	No. Female	% Female	No. Ovig. Female	% Ovig. Female
1989	132	170.0	1.3	5,192	39.0	4,958	96.0	234	4.0	213	4.1
1990	132	176.8	0.9	4,283	22.0	3,910	91.0	373	9.0	343	8.0
1991	205	260.6	1.27	5,989	29.2	5,559	92.8	430	7.2	325	5.4
1992	371	272.5	0.73	5,195	14.0	4,565	87.9	630	12.1	610	11.7
1993	336	123.7	0.37	2,507	7.5	2,025	80.8	482	19.2	471	18.8
1994	351	132.5	0.38	3,815	10.9	3,651	95.7	164	4.3	159	4.2
1995	350	206.2	0.59	5,053	14.4	4,834	95.7	219	4.3	196	3.9
1996	351	182.1	0.52	4,617	13.2	NA	NA	237	5.1	NA	NA
1997	350	142.0	0.41	3,828	10.9	3,602	94.1	226	5.9	215	5.6
1998	264	76.5	0.29	2,252	8.5	2,131	94.6	121	5.4	121	5.4
1999	349	164.7	0.47	4,391	12.6	NA	NA	NA	NA	NA	NA

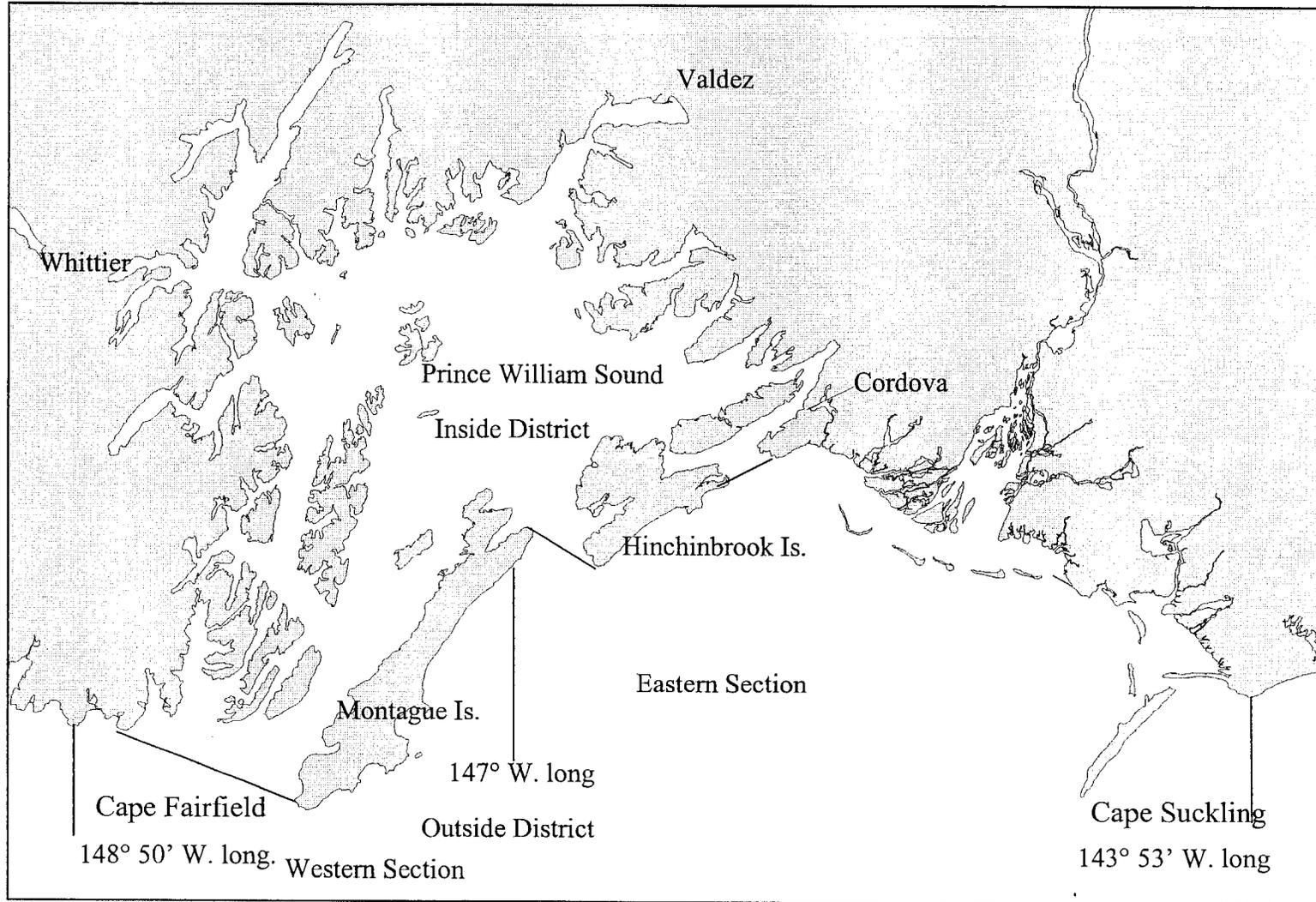


Figure 1. Prince William Sound Shellfish Registration Area E.

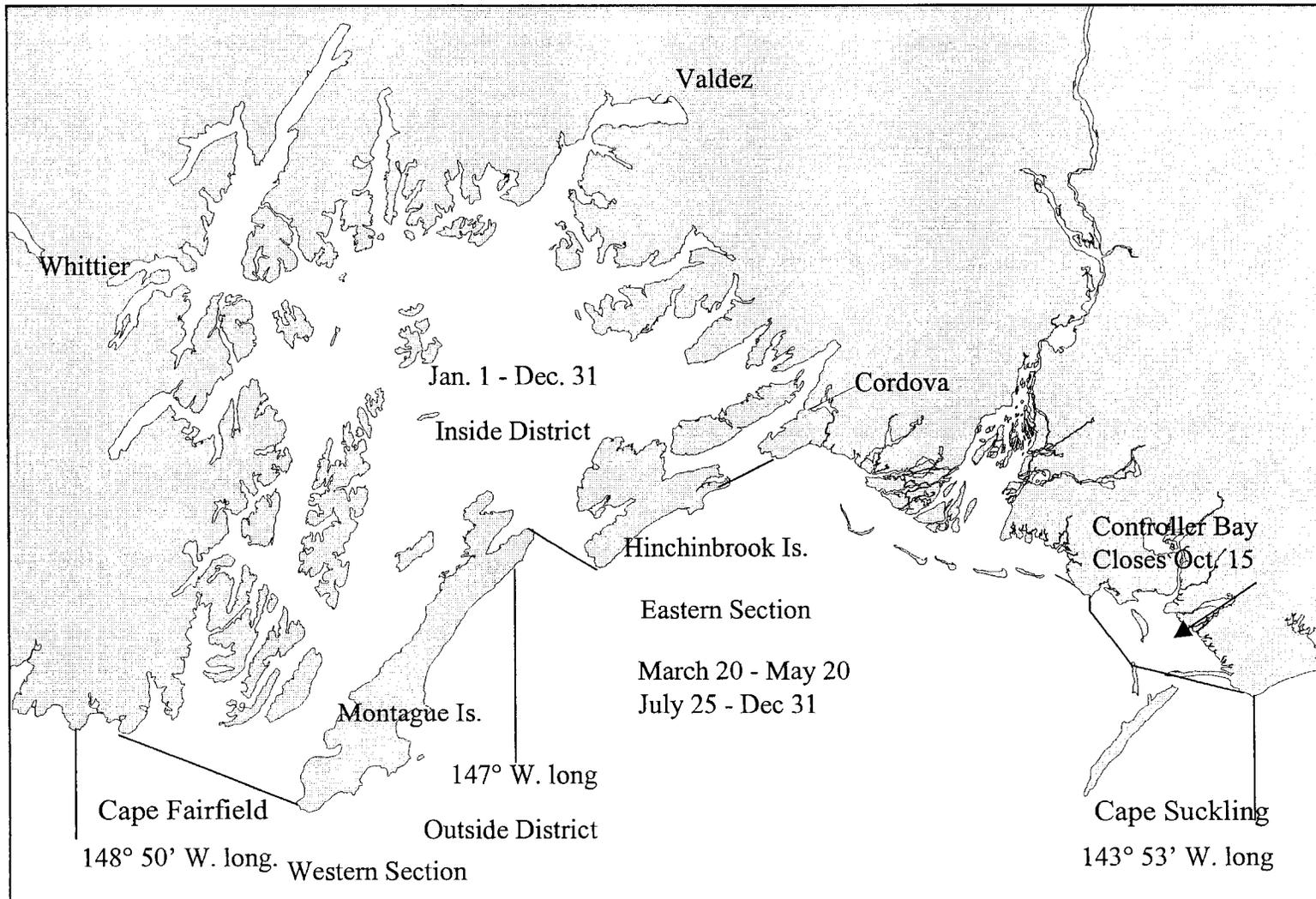


Figure 2. Prince William Sound Dungeness crab fishing districts and seasons.

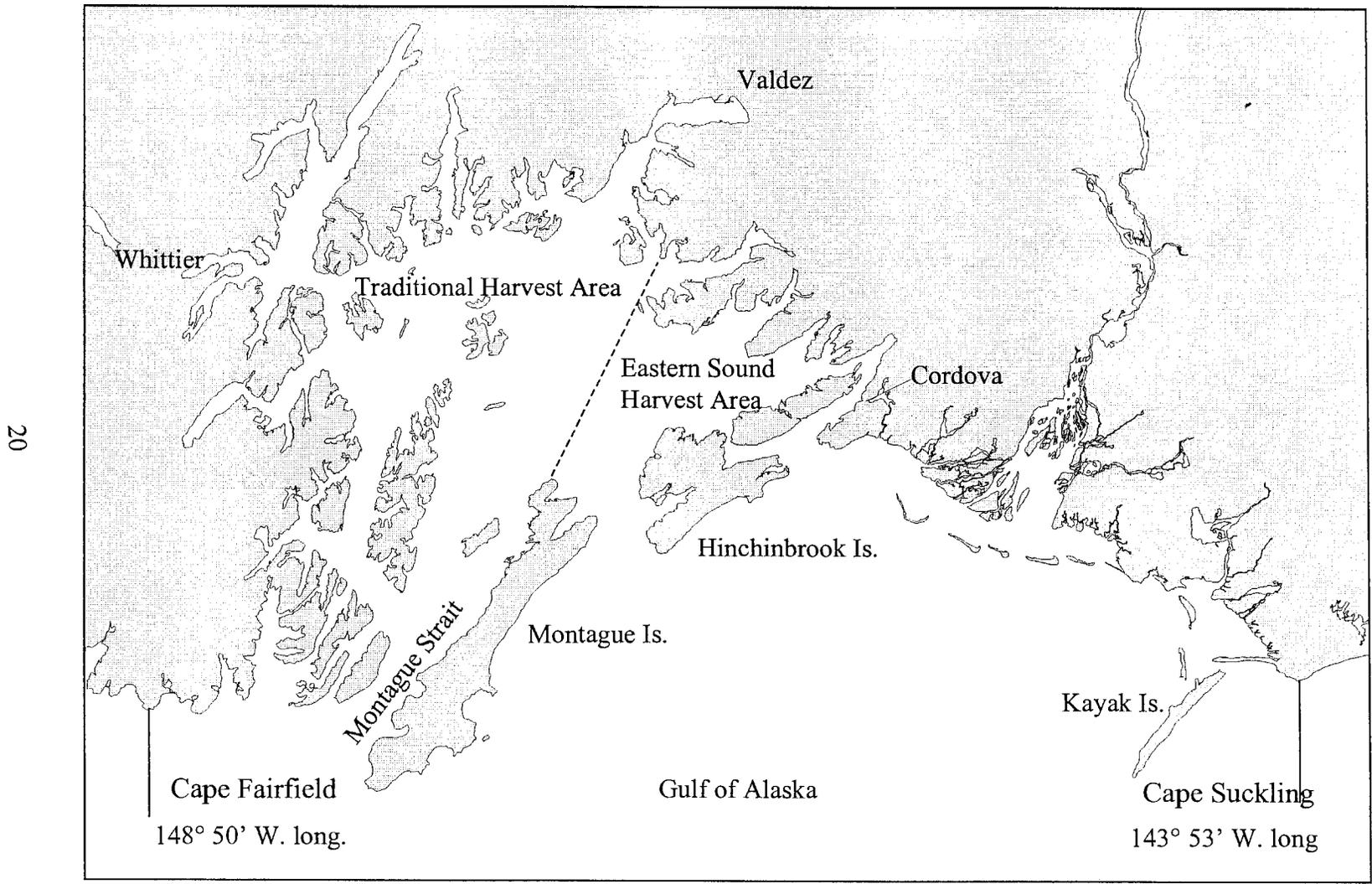


Figure 3. Prince William Sound pot shrimp management areas.

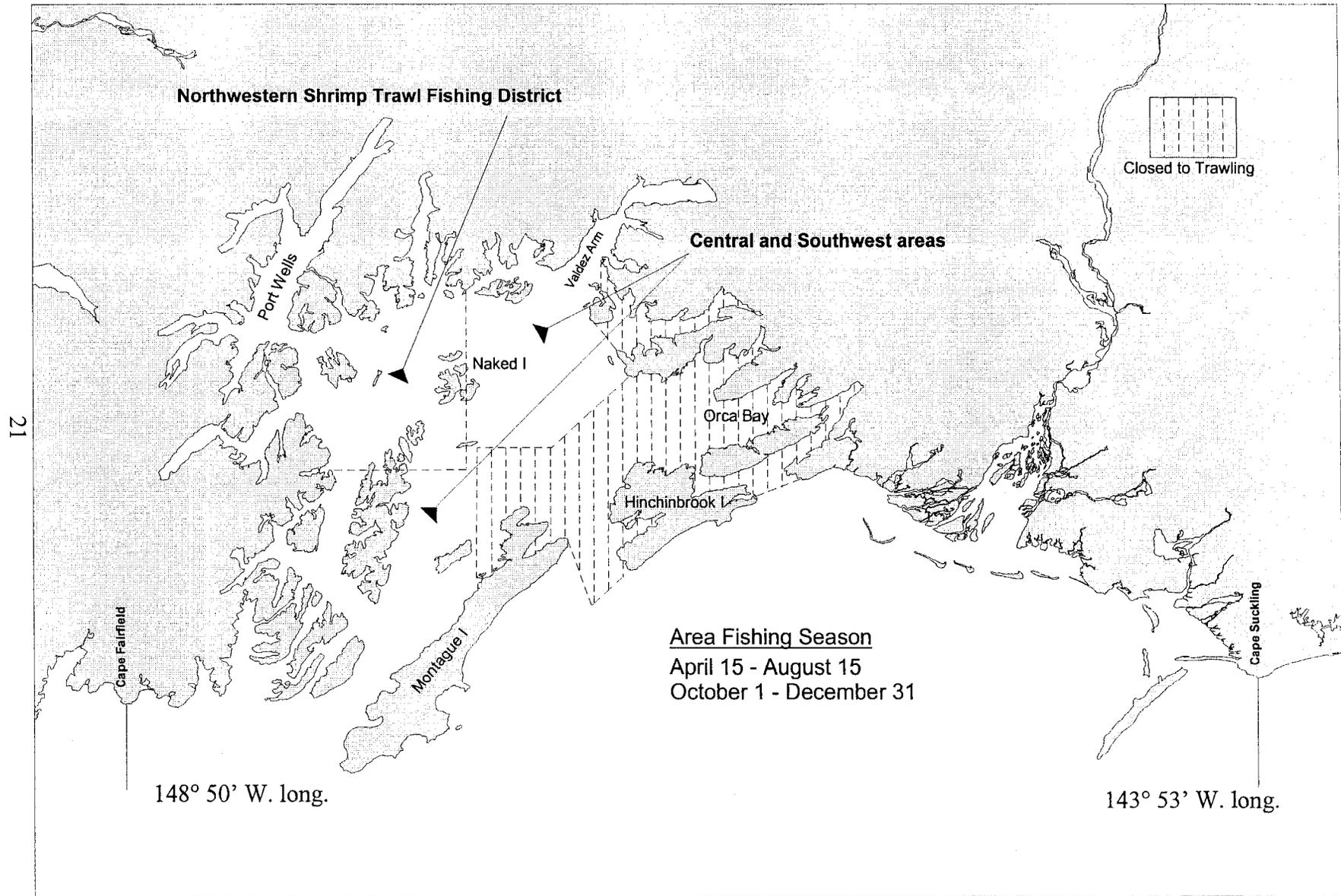


Figure 4. Prince William Sound trawl shrimp fishing areas and seasons.

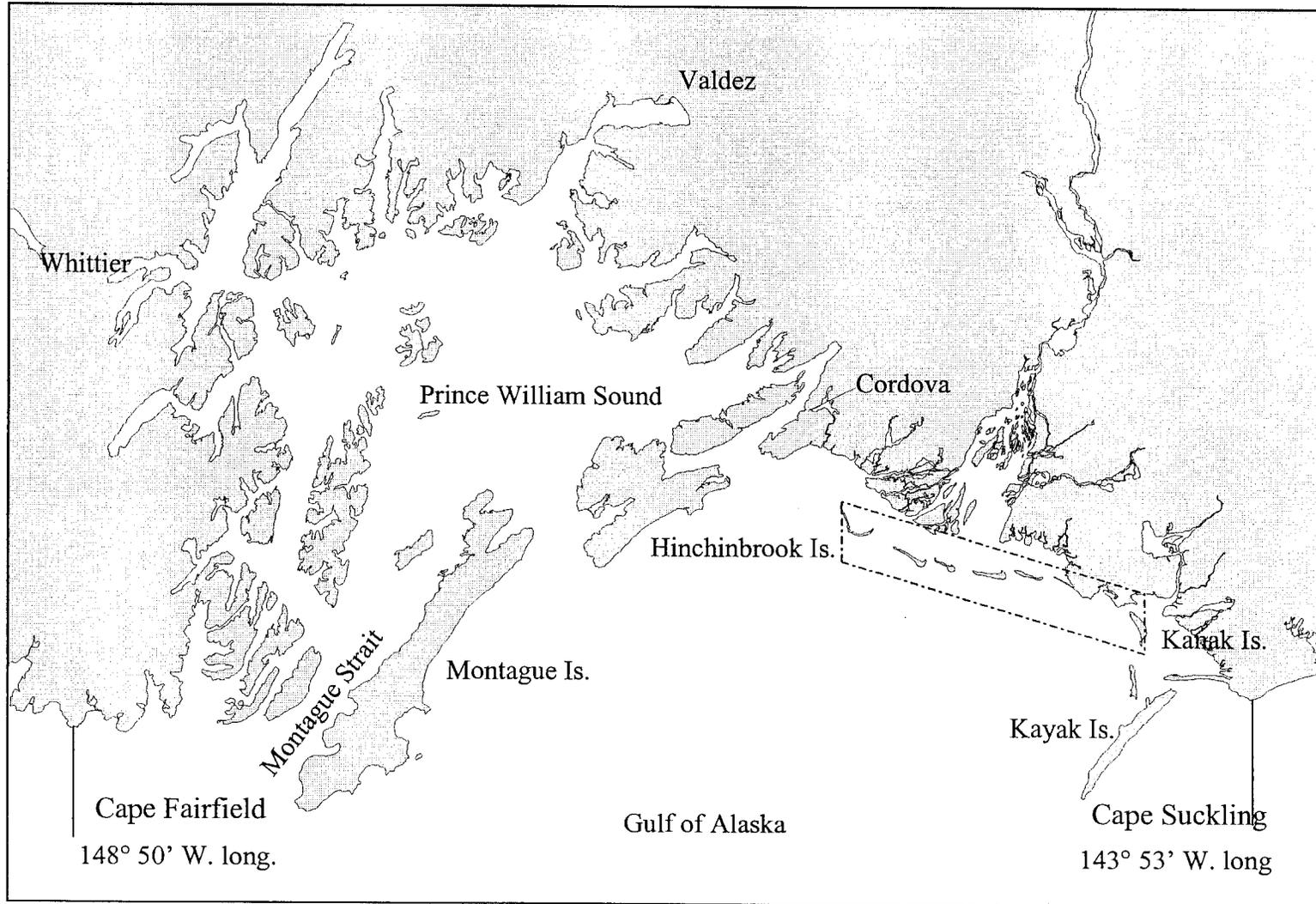


Figure 5. Copper River razor clam harvest area.

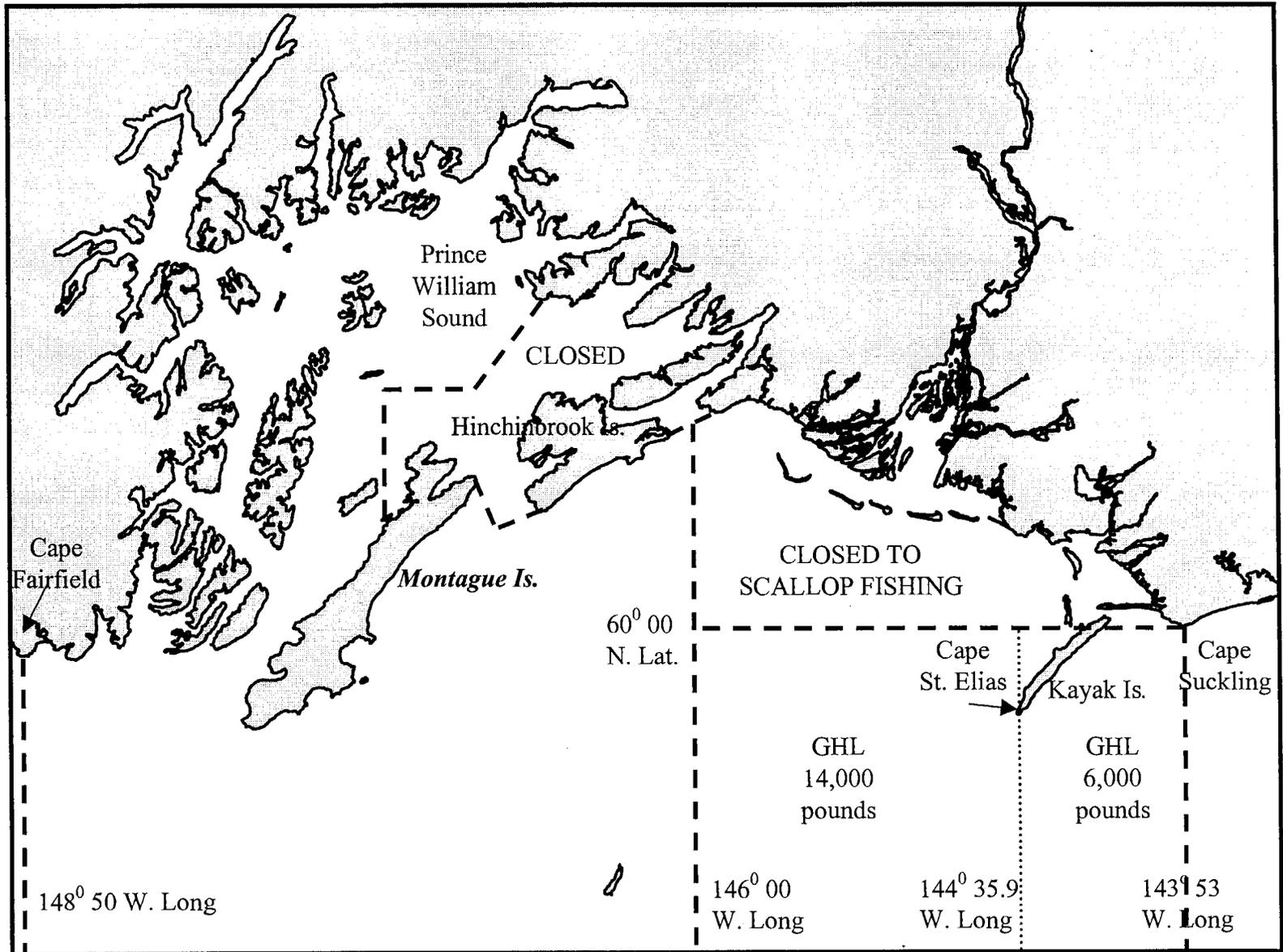


Figure 6. Prince William Sound scallop fishing areas and 1999 GHL.

Appendix A. Prince William Sound Area Dungeness crab commercial harvest, 1960-1999.

Year	Outside District	Number of Landings	Number of Vessels	Number of Crab	Average Weight	Percent Recruits	Inside District Orca Inlet	Number of Vessels	Inside District Other Areas	Number of Landings	Number of Vessels	Total lb.
1960							1,524,326					1,524,326
1961							990,242					990,242
1962							1,353,190					1,353,190
1963							1,216,846					1,216,846
1964							1,290,929					1,290,929
1965							1,240,372					1,240,372
1966							999,341					999,341
1967							N/A					N/A
1968							579,279					579,279
1969	336,696						541,822					878,518
1970	78,223						660,411					738,634
1971	78,848						430,976					509,824
1972	437,865						286,808					724,673
1973	458,613						347,764					806,377
1974	290,149						269,015					559,164
1975	654,410						163,631					818,041
1976	254,933		4				35,399	3				290,332
1977	506,751		4				228,858	23				735,609
1978	1,319,451		12				648,439	34	49,571		17	2,053,461
1979	504,770		19				123,245	32	20,924		16	652,924
1980	659,667		10				CLOSED		31,152		5	690,819
1981	1,503,574	202	18			25	CLOSED		5,683	11	5	1,509,257
1982	757,911	139	16	332,417	2.2	26	CLOSED		4,221	4	2	762,182
1983	379,094	86	9	184,026	2.1	49	CLOSED		511	14	2	379,605
1984	826,778	88	10	413,394	2.0	92	CLOSED		150	2	2	826,938
1985	1,006,196	124	17	483,748	2.1	63	CLOSED		1,233	5	1	1,007,429
1986	1,090,477	105	16	531,940	2.1	58	CLOSED		0			1,090,477
1987	887,713	92	13	438,974	2.0	34	CLOSED		5,461	2	2	893,174
1988	602,969	48	8	298,569	2.0	52	CLOSED		0			602,969
1989	635,976	43	9	326,226	2.0	25	CLOSED		0			635,976
1990	397,913	63	17	196,266	2.0	36	CLOSED		0			397,913
1991	70,259	32	14	39,033	1.8	62	CLOSED		0			70,259
1992	(1) 2,458	5	2	1,229	2.0	N/A	CLOSED		0			2,458
1993-1997	SEASON	CLOSED					CLOSED	NO	EFFORT			
1998-2000	(2) SEASON	CLOSED					SEASON	CLOSED				

N/A Not available

(1) Spring season only

(2) Closed to August 25, 2000

Appendix B. Prince William Sound Management Area spot shrimp harvest, 1960-1999.

Year	Vessels	Landings	W E I G H T (lb) ¹			Total
			Spot	Coonstripe	Other	Whole wt.
1960						4,988
1961						---
1962						3,576
1963						1,101
1964						4,248
1965						4,356
1966						---
1967						749
1968						6,866
1969						5,146
1970						19,776
1971						13,073
1972						6,949
1973						6,370
1974						24,978
1975						4,150
1976						2,410
1977						7,516
1978	9	17	N/A	N/A	N/A	15,466
1979	17	98	N/A	N/A	N/A	52,208
1980	23	155	84,787	5,174	67	90,028
1981	51	509	153,017	20,055	465	173,537
1982	57	397	205,746	7,250	784	213,781
1983	71	646	198,719	14,119	583	213,420
1984	79	513	198,729	7,911	640	207,280
1985	78	528	271,928	3,919	860	276,707
1986	80	540	286,105	3,715	812	290,632
1987	86	498	265,707	3,795	151	269,653
1988	76	433	191,630	764	48	192,442
1989	33	69	28,884	431	0	29,315
1990	23	59	36,378	358	0	36,737
1991	15	45	17,302	278	0	17,580
1992-1999	Closed					

¹ Catches converted from tail weight to whole weight using a conversion factor of 2.

Appendix C. Prince William Sound Management Area trawl shrimp harvest, 1972–1999.

Year	Vessels	Landings	Weight (lb)				Total Pounds
			Pink	Sidestripe	Other	Deadloss	
1972	N/A	N/A	N/A	N/A	N/A	N/A	5,153
1973	"	"	"	"	"	"	4,243
1974	"	"	"	"	"	"	1,345
1975	"	"	"	"	"	"	26,961
1976	"	"	"	"	"	"	134,115
1977	"	"	"	"	"	"	170,757
1978	8	"	"	"	"	"	440,684
1979	4	"	"	"	"	"	634,518
1980	6	"	"	"	"	"	557,328
1981	4	"	"	"	"	"	70,560
1982	9	"	"	"	"	"	346,517
1983	13	46	420,275	1,058	2,345	—	423,678
1984	14	55	1,292,643	8,842	1,155	—	1,302,640
1985	6	44	432,514	15,696	440	—	448,650
1986	3	44	218,156	27,701	13	—	245,870
1987	*	*	*	*	*	—	*
1988	4	99	497	111,898	52	—	112,447
1989	*	*	*	*	*	—	*
1990	4	89	3,348	105,795	15	18,303	127,461
1991	5	67	3,453	84,483	193	51,429	139,558
1992	5	70	651	196,467	28	49,097	246,243
1993	7	72	23	190,976	51	55,140	246,190
1994	6	47	749	85,980	0	24,134	110,863
1995	4	39	0	73,706	0	24,189	97,895
1996	3	42	0	89,551	0	21,704	111,255
1997	3	63	0	70,026	0	22,060	92,086
1998	*	*	*	*	*	—	*
1999	3	47	0	56,386	0	7,754	64,140

(*) Catch data is confidential due to the few number of participants.

Appendix D. Prince William Sound Area razor clam harvest, 1960-1999.

Year	COMMERCIAL		NON -	COMMERCIAL ¹
	Diggers	Pounds	Diggers	Pounds
1960		433,930		
1961		261,628		
1962		208,698		
1963		86,340		
1964		39,275		
1965		86,477		
1966		27,063		
1967		98,446		
1968		72,806		
1969		26,887		
1970		27,909		
1971		37,972		
1972		30,326		
1973		30,318		
1974		29,747		
1975		15,443		
1976		1,516		
1977	11	2,160		
1978	54	29,865		
1979	26	12,904		
1980	21	5,881		
1981	7	28,970		
1982	12	15,275		
1983	41	124,835		
1984	41	168,426		
1985	25	60,274	37	4,930
1986	17	13,122	38	4,831
1987	12	40,954	83	6,225
1988	4	6,766	52	2,768
1989	No Effort	0	50	2,903
1990	"	0	50	2,641
1991	"	0	77	1,484
1992	"	0	92	2,403
1993	Confidential	Confidential	37	1,131
1994	No Effort	0	28	459
1995	"	0	14	92
1996	"	0	19	381
1997	"	0	10	145
1998	"	0	4	32
1999	"	0	5	29

¹ A permit is required to harvest razor clams from the Copper River Delta for personal use, sport, or subsistence.

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